To: "Suplee, Mike" [msuplee@mt.gov]; LaVigne, Paul" [plavigne@mt.gov]; ina Laidlaw/MO/R8/USEPA/US@EPA[]
From: "Blend, Jeff"
Sent: Tue 7/12/2011 7:43:23 PM
Subject: Spreadsheet
MT S_W Demonstrationw_TinaJeff (2).xlsx

Mike, Paul and Tina:

Attached is the latest spreadsheet with corrections. The main thing to look at is the new tab labeled "2% MHI vs RO.." where things are summed up. Again, the results remain consistent. Thanks to Tina for some of the new info. I did not include your numbers moving to the next less stringent level of treatment to RO, because I saw no reason in this document (but I did keep your document). I did try to include numbers for variance levels. We can keep tweeking this.

I think that doing this public demonstration with this spreadsheet as a backup is a great idea. We may want to add the summary table into the main text at some point.

Jeff Blend
(406) 841-5233
jblend@mt.gov

Economist and Energy Analyst
Energy and Pollution Prevention Bureau
Montana Dept. of Environmental Quality
1100 N. Last Chance Gulch
P.O. Box 200901
Helena, MT 59620-0901

Community	Current Treatment Technology	Would the criteria apply? Or is there dilution capability?	Design Flow (MGD)	Actual Flow (MGD)	Community Population	Number of Households (Population / 2.5) based on 2000 Census	Median Household Income (2010) - countywide MHI. Recommend updating for service area.	Current average household sewer bill per year (2008 / 2011)
Kalispell	BNR (modified Johannesburg); 3.1 to 5.4 MGD; avg. .12 mg/l TP; 10 mg/l TN.	EOP; Ashley Creek	5.4	3.10	27,544	10,012	$45,594.00	$216.00
Bozeman	some BNR now; 5-stage Barrdenpho; new plant will be BNR (1 mg/l TP; 3 mg/l TN starting in 2011); current 5.8 MGD; increasing to 13.9 mgd	Yes. Also Gallatin TMDL in the works.	13.8	5.80	37,280	14,614	$47,065.00	$372.00
Helena	BNR; 3 mg/l TP; 10 mg/l TN; design capacity of 5.4; current discharge ~3.0 MGD	Yes. WLA set in TMDL based on numeric criteria.	5.4	3.00	28,190	12,337	$52,317.00	$265.44
Butte	Technology is activated sludge (TN of 18.5 mg/l; TP of 2.11 mg/l); under Order to Construct to membrane BNR; current design is 8.5 MGD; talking about lowering to 6.1 MGD	Yes. EOP.	8.5	4.00	33,525	14,041	$40,055.00	$162.00
"Big 7" Communities that Discharge to Large Rivers - criteria wouldn't apply								
Missoula	advanced secondary treatment facility with biological nutrient removal and ultraviolet disinfection; 6-9 MGD	SSC; should Missoula be included?			66,788	27,553	$40,130.00	$152.14
Great Falls	conventional 2ndary activated sludge (max 21-MGD; avg. 10 MGD)	Missouri River	25	26	58,505	23,998	$40,434.00	$187.20
Billings	2ndary treatment; Design flow of 26 MGD (avg.) and 40 MGD max.	N/A. Discharge into the Yellowstone River.	25	26	104,170	41,841	$45,004.00	$218.28
Smaller Communities with Lower MHIs								

Philipsburg	7th sequential batch reactor tank	Yes.	0.2	0.2	820	399	$35,806.00	200
Columbia Falls		Yes	0.766	0.37	4,688	1,621	$38,750	$532.20
Cut Bank		Yes			2,869	1,290	$29,000	$138.48
Deer Lodge		Yes			3,111	1,522	$40,320	$409.56
Manhattan		Yes			1,520	523	$50,729	$362.40
Circle								
Redlodge					9,756.00		$40,379	305.28
Havre					16,632.00		$38,082	240.00
Montana City								
Big Fork								
Highwood								

Belgrade	?? Separate WWTP? Part of gallaitin county.							313.80

NOTE: Operation costs include energy and chemical costs only and do not include labor and maintenance cost. As such, these numbers are on the low side.

NOTE: The numbers are intended to provide ROUGH ESTIMATES for discussion purposes and do not reflect the site-specific conditions at each plant.

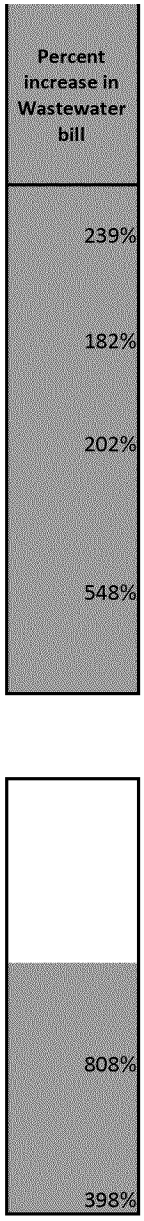
NOTE: Capital costs were assumed to cover a 20-year bond with 5% interest (used 0.0802 conversion factor)

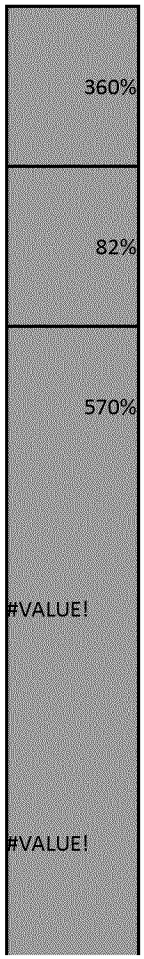
NOTE: MHI is based on data from Montana CEIC based on 2010 estimates.

Current average sewer fee as % of MHI	Notes	Capital cost (million dollars) to meet the numeric nutrient criteria (WERF)	Annual Capital cost to meet the numeric nutrient criteria (L4 WERF)	Annual Operations costs to meet the numeric nutrient criteria L4WERF	Annual Capital and Operations cost ($)	Annual Additional Cost per Household (increase in sewer rate)	Predicted average household sewer fee to meet criteria	Expected % MHI to Meet Base Numeric Nutrient Criteria (plus current wastewater fees)
0.47%	Sewer rates obtained from City in 2011. Plant ~WERF Level 2.	$49.14	$3,941,028.00	1,228,530.00	$5,169,558.00	$516.34	$732	1.61
0.79%	Sewer rates obtained from City in 2011. Plant ~WERF Level 2. Really Level 3 for TN and 1 for TP	$102.12	8,190,024.00	1,684,610.00	$9,874,634.00	$675.70	$1,048	2.23
0.51%	Sewer rates obtained from City in 2011. Plant ~ WERF Level 1.	$67.50	$5,413,500.00	1,188,900.00	$6,602,400.00	$535.17	$801	1.53
0.40%	Sewer Fee based on DEQ estimtes. Sewer Fee based on DEQ estimtes. Included $27 million upgrade in new capital costs which would bring them to 5 TN and 0.1 TP	$133.75	$10,726,750.00	1,731,200.00	$12,457,950.00	$887.26	$1,049	2.62
0.38%								
0.46%	The numbers for Billings and Great Falls (population, treatment levels, etc.) were obtained from HDR.	$312.50	$25,062,500.00	$11,252,800.0	$36,315,300.00	$1,513.26	$1,700	4.21
0.49%	The numbers for Billings and Great Falls (population, treatment levels, etc.) were obtained from HDR.	$312.50	$25,062,500.00	$11,252,800.0	$36,315,300.00	$867.94	$1,086	2.41

0.56%	lagoon to simple mechanical system - ref: Gary Swanson, consulting engineer- 15TN, 2TP	$200,500.00	$200,500.00	86,560.00	$287,060.00	$719.45	$919	2.57
1.37%	Upgrade to RO	$6.97	$559,042.12	147,819.90	$706,862.02	$436.07	$968	2.50
0.48%	4000 gallons. Base rate $9.48 at 3000 gallons plus $2.06 for next 1,000 gallons	$12.50	$1,018,540.00	6.97	$1,018,546.97	$789.57	$928	3.20
1.02%	Moving from an existing lagoon to mechanical plant with land application. Ref: planning document--To get to variance only. Because this would be a land application system, so theoretically, the N and P would be zero to the Clark Fork	?	$1,261,145.00	?	#VALUE!	#VALUE!	#VALUE!	#VALUE!
0.71%	Mainly designed to remove ammonia and some TN, but now have NO3 limit. May be able to meet with operational changes. TP of 2 mg/l may require more capital & O&M expenses. Ref: planning document, SRF loan application	?	$606,312.00	?	#VALUE!	#VALUE!	#VALUE!	#VALUE!
	Sewer Fee and MHI based on DEQ estimates. DEQ MHI value less than the 2010 USDA county data.							
0.63%	Sewer Fee and MHI based on DEQ estimates. DEQ MHI value less than the 2010 USDA county data.							

	Sewer Fee based on DEQ estimtes.							


Percent increase in Wastewater bill
239%
182%
202%
548%
808%
398%


360%
82%
570%
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WERF

Level	Description	Capital Cost ($/gpd)	Operations ($1,000/yr/10 MG Treated)
Level 1	No N and P removal	9.3	250
Level 2	1 mg/l TP; 8 mg/l TN	12.7	350
Level 3	0.1-0.3 mg/l TP; 4-8 mg/l TN	14.4	640
Level 4	<0.1 mg/l TP; 3 mg/l TN	15.3	880
Level 5	<0.01 mg/l TP; 1 mg/l TN	21.8	1370

Costs to Meet Criteria	Capital Cost($million/MGD)	Design Flow	Facility Upgrade Capital Costs ($million)	Annualized Capital Costs (Assumed 20-yr bond & 5% interest; $million/year)
Kalispell	9.1	5.4	$49.14	$3.94
Bozeman	7.4	13.8	$102.12	$8.19
Helena	12.5	5.4	$67.50	$5.41
Butte	12.5	8.5	$106.25	$8.52
Philisburg	12.5	0.2	$2.50	$0.20
Billings	12.5	25	$312.50	$25.06
Great Falls	12.5	25	$312.50	25.0625
Columbia Falls	9.1	0.766	$6.97	0.55904

Deer Lodge
Manhattan
Columbia Falls

Annualized Capital Costs (Assumed 20-yr bond & 5% interest; $million/year)	Operations ($1/ MG/day Treated)	Operations Costs ($/ year/ 1 MGD)	Actual Flow	Facility Upgrade Operations Costs ($/year/1 MGD) based on Facility MGD	Membrane Replacement Cost ($24,000 /yr/1 MGD)*Actual Flow
$3,941,028.00	1020	372,300.00	3.10	1,154,130.00	74,400.00
$8,190,024.00	730	266,450.00	5.80	1,545,410.00	139,200.00
$5,413,500.00	1020	372,300.00	3.00	1,116,900.00	72,000.00
$8,521,250.00	1120	408,800.00	4.00	1,635,200.00	96,000.00
$200,500.00	1120	408,800.00	0.20	81,760.00	4,800.00
$25,062,500.00	1120	408,800.00	26.00	10,628,800.00	624,000.00
$25,062,500.00	1120	408,800.00	26	10,628,800.00	624,000.00
$559,042.12	1020	372,300.00	0.37	138,867.90	8,952.00

Total Operations costs including membrane replacement
1,228,530.00
1,684,610.00
1,188,900.00
1,731,200.00
86,560.00
11,252,800.00
$11,252,800.00
$147,819.90

Community	Current Treatment Technology	Would the criteria apply? Or is there dilution capability?	Community Population
Kalispell	BNR (modified Johannesburg); 3.1 to 5.4 MGD; avg. .12 mg/l TP; 10 mg/l TN.	EOP; Ashley Creek	27,544
Bozeman	some BNR now; 5-stage Barrdenpho; new plant will be BNR (1 mg/l TP; 3 mg/l TN starting in 2011); current 5.8 MGD; increasing to 13.9 mgd	Yes. Also Gallatin TMDL in the works.	37,280
Helena	BNR; 3 mg/l TP; 10 mg/l TN; design capacity of 5.4; current discharge ~3.0 MGD	Yes. WLA set in TMDL based on numeric criteria.	28,190
Butte	Technology is activated sludge (TN of 18.5 mg/l; TP of 2.11 mg/l); under Order to Construct to membrane BNR; current design is 8.5 MGD; talking about lowering to 6.1 MGD	Yes. EOP.	33,525
"Big 7" Communities that Discharge to Large Rivers - criteria wouldn't apply			
Missoula	advanced secondary treatment facility with biological nutrient removal and ultraviolet disinfection; 6-9 MGD	SSC; should Missoula be included?	108,623
Great Falls	conventional 2ndary activated sludge (max 21-MGD; avg. 10 MGD)	Missouri River	82,178
Billings	2ndary treatment; Design flow of 26 MGD (avg.) and 40 MGD max.	N/A. Discharge into the Yellowstone River.	104,170
Smaller Communities with Lower MHIs			
Philipsburg	7th sequential batch reactor tank	Yes.	820
Cut Bank		Yes	2,869

Deer Lodge		Yes	3,111
Manhattan		Yes	1,520
Columbia Falls	Columbia Falls already meets variance level standards	Yes- but Columbia Falls already meets it	4,688
Circle			
Redlodge			9,756.00
Havre			16,632.00
Montana City			
Big Fork			
Highwood			
Belgrade	?? Separate WWTP? Part of gallaitin county.		

NOTE: Operation costs include energy and chemical costs only and do not include labor and mainten
NOTE: The numbers are intended to provide ROUGH ESTIMATES for discussion purposes and do not r
NOTE: Capital costs were assumed to cover a 20-year bond with 5% interest (used 0.0802 conversion f
NOTE: MHI is based on data available on: http://www.ers.usda.gov/data/unemployment/RDList2.as
NOTE: Brine disposal costs are estimated based on calculations developed by Region 5. The city of M

draft numbers pending input
final draft numbers

Number of Households (Population / 2.5) based on 2000 Census	Median Household Income (2010) - countywide MHI. Recommend updating for service area.	Current average household sewer bill per year (2008 / 2011)	Current average sewer fee as % of MHI	Notes
10,012	$45,594.00	$216.00	0.47%	Sewer rates obtained from City in 2011. Plant ~WERF Level 2.
14,614	$47,065.00	$372.00	0.79%	Sewer rates obtained from City in 2011. Plant ~WERF Level 2. Really Level 3 for TN and 1 for TP
12,337	$52,317.00	$265.44	0.51%	Sewer rates obtained from City in 2011. Plant ~ WERF Level 1.
14,041	$40,055.00	$162.00	0.40%	Sewer Fee based on DEQ estimtes. Sewer Fee based on DEQ estimtes. Included $27 million upgrade in new capital costs which would bring them to 5 TN and 0.1 TP
28,290	$40,130.00	$152.14	0.38%	
23,998	$40,434.00	$187.20	0.46%	and Great Falls (population, treatment levels, etc.) were obtained from HDR.
41,841	$45,004.00	$218.28	0.49%	The numbers for Billings and Great Falls (population, treatment levels, etc.) were obtained from HDR.
399	35806.00	200	0.56%	lagoon to simple mechanical system - ref: Gary Swanson, consulting engineer- 15TN, 2TP
1,290	$29,000	$138.48	0.48%	4000 gallons. Base rate $9.48 at 3000 gallons plus $2.06 for next 1,000 gallons

1,522	$40,320	$409.56	1.02%	Moving from an existing lagoon to mechanical plant with land application. Ref: planning document--To get to variance only. Because this would be a land application system, so theoretically, the N and P would be zero to the Clark Fork
523	$50,729	$362.40	0.71%	Mainly designed to remove ammonia and some TN, but now have NO3 limit. May be able to meet with operational changes. TP of 2 mg/l may require more capital & O&M expenses. Ref: planning document, SRF loan application
1,621	$38,750	$532.20	1.37%	Upgrade to an existing Chemical P-removal plant - actual effluent concentrations are 4 TN and 0.05TP--**already included in current fee**
	$40,379	305.28		Sewer Fee and MHI based on DEQ estimates. DEQ MHI value less than the 2010 USDA county data.
	$38,082	240.00		Sewer Fee and MHI based on DEQ estimates. DEQ MHI value less than the 2010 USDA county data.
		313.80		Sewer Fee based on DEQ estimtes.

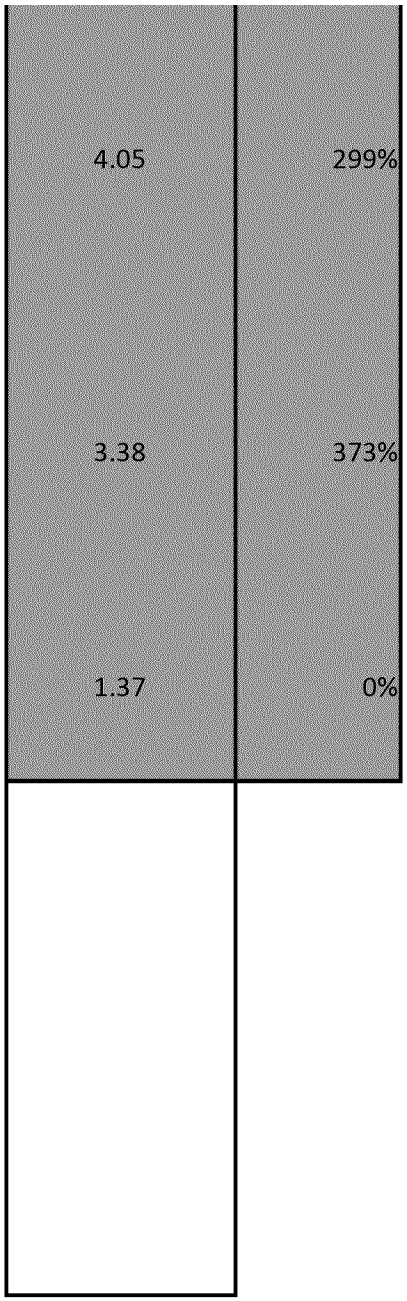
oor and maintenance cost. As such, these numbers are on the low side.
ses and do not reflect the site-specific conditions at each plant.
ance cost. As such, these numbers are on the low side.
eflect the site-specific conditions at each plant.
actor)
p?ST=MT&SF=11A. These MHI values are lower than DEQ's values. For example, the USDA site showed the MHI
adison's plant was used at the basis for the calculation since it was 3 MGD. This is a VERY rough estimate.

Capital cost (million dollars) to meet the numeric nutrient criteria (WERF)	Annual Capital cost to meet the numeric nutrient criteria (L4 WERF)	Annual Operations costs to meet the numeric nutrient criteria L4WERF	Annual Capital and Operations cost ($)	Annual Additional Cost per Household (increase in sewer rate)	Predicted average household sewer fee to meet criteria
$0.00	$0.00	0.00	$0.00	$0.00	$216
$0.00	$0.00	0.00	$0.00	$0.00	$372
$18.36	$1,472,472.00	109,500.00	$1,581,972.00	$128.23	$394
$56.40	$4,523,280.00	146,000.00	$4,669,280.00	$332.55	$495
$85.00	$6,817,000.00	$949,000.0	$7,766,000.00	$323.61	$511
$85.00	$6,817,000.00	$949,000.0	$7,766,000.00	$185.61	$404
$0.68	$54,536.00	7,300.00	$61,836.00	$154.98	$355
$12.50	$1,018,540.00	7,300.00	$1,025,840.00	$795.22	$934

$15.25	$1,261,145.00	602,000.00	$1,863,145.00	$1,224.14	$1,634
$7.56	$606,312.00	100,000.00	$706,312.00	$1,350.50	$1,713
$3.92	$315,186.00	75,000.00	$390,186.00	$0.00	$532

for Cutbank at $29,000 compared to DEQ's estimates of $43,000. I inserted DEQ's MHI values into the table for C

Expected % MHI to Meet Base Numeric Nutrient Criteria (plus current wastewater fees)	Percent increase in Wastewater bill	2% MHI	Total additional annual amount town would spend total to get to 2% MHI
0.47	0%	$911.88	$6,967,150.56
0.79	0%	$941.30	$8,319,750.20
0.75	48%	$1,046.34	$9,633,963.30
1.23	205%	$801.10	$8,973,603.10
1.26	173%	$808.68	$14,914,277.04
0.90	85%	$900.08	$28,527,193.80
0.99	77%	$716.12	$205,931.88
3.22	574%	$580.00	$569,560.80



	$806.40	$603,990.48
	$1,014.58	$341,090.14
	$775.00	$393,578.80

utbank and the %MHI reduced from 3 to 2.14%.

WERF

Level	Description	Capital Cost ($/gpd)	Operations ($1,000/yr/10 MG Treated)
Level 1	No N and P removal	9.3	250
Level 2	1 mg/l TP; 8 mg/l TN	12.7	350
Level 3	0.1-0.3 mg/l TP; 4-8 mg/l TN	14.4	640
Level 4	<0.1 mg/l TP; 3 mg/l TN	15.3	880
Level 5	<0.01 mg/l TP; 1 mg/l TN	21.8	1370

Costs to Meet Criteria	Capital Cost($million/MGD)	Design Flow	Facility Upgrade Capital Costs ($million)	Annualized Capital Costs (Assumed 20-yr bond & 5% interest; $million/year)
Kalispell	0	5.4	$0.00	$0.00
Bozeman	0	13.8	$0.00	$0.00
Helena	3.4	5.4	$18.36	$1.47
Butte	3.4	8.5	$28.90	$2.32
Philisburg	3.4	0.2	$0.68	$0.05
Billings	3.4	25	$85.00	$6.82
Great Falls	3.4	25	$85.00	6.817

Annualized Capital Costs (Assumed 20-yr bond & 5% interest; $million/year)	Operations ($1/ MG/day Treated)	Operations Costs ($/ year/ 1 MGD)	Actual Flow	Facility Upgrade Operations Costs ($/year/1 MGD) based on Facility MGD	Membrane Replacement Cost ($24,000 /yr/1 MGD)*Actual Flow
$0.00	0	0.00	3.10	0.00	0.00
$0.00	0	0.00	5.80	0.00	0.00
$1,472,472.00	100	36,500.00	3.00	109,500.00	0.00
$2,317,780.00	100	36,500.00	4.00	146,000.00	0.00
$54,536.00	100	36,500.00	0.20	7,300.00	0.00
$6,817,000.00	100	36,500.00	26.00	949,000.00	0.00
$6,817,000.00	100	36,500.00	26	949,000.00	0.00

Total Operations costs including membrane replacement
0.00
0.00
109,500.00
146,000.00
7,300.00
949,000.00
$949,000.00

Community	Median Household Income (2010) - countywide MHI. Recommend updating for service area.	Number of Households (Population / 2.5) based on 2000 Census	Current Average Annual Household Wastewater Bill	Design Flow (MGD)	Actual Flow (MGD)	Current wastewater MHI	Percent MHI needed to get to RO/Base Numeric Nutrient Criteria (including current fees)
Kalispell	$45,594.00	10,012	$216.00	5.4	3.10	0.47%	1.61%
Bozeman	$47,065.00	14,614	$372.00	13.8	5.80	0.79%	2.23%
Helena	$52,317.00	12,337	$265.44	5.4	3.00	0.51%	1.53%
Butte	$40,055.00	14,041	$162.00	8.5	4.00	0.40%	2.62%
Missoula	$40,130.00	28,290	$152.14			0.38%	N/A
Great Falls	$40,434.00	23,998	$187.20	25	26	0.46%	4.21%
Billings	$45,004.00	41,841	$218.28	25	26	0.49%	2.41%
Philipsburg	$35,806.00	399	$200.00	0.2	0.2	0.56%	2.57%
Cut Bank	$29,000.00	1,290	$138.48			0.48%	
Deer Lodge	$40,320.00	1,522	$409.56			1.02%	
Manhattan	$50,729.00	523	$362.40			0.71%	
Columbia Falls	$38,750.00	1,621	$532.20	0.766	0.37	1.37%	2.50%

Yellow fill = Greater than 2% MHI to reach to certain level of wastewater treatment

Orange fill = Greater than 100% increase in wastewater fee costs to reach to certain level of w

Blue Fill = Town already meets the standard so no new costs or treatment needed

Increase over current Wastewater Bill to Reach RO	Percent MHI needed to get to Variance in SB367 (including current fees)	Increase over current Wastewater Bill to Reach Variance	2% MHI per household	Total additional annual amount Town Would Need to Spend to get to 2% MHI
239%	0.47%	0%	$912	$6,967,151
182%	0.79%	0%	$941	$8,319,750
202%	0.75%	48%	$1,046	$9,633,963
548%	1.23%	205%	$801	$8,973,603
N/A	N/A	N/A	$803	$18,401,513
808%	1.26%	173%	$809	$14,914,277
398%	0.90%	85%	$900	$28,527,194
360%	0.99%	77%	$716	$205,932
	3.22%	574%	$580	$569,561
	4.05%	299%	$806	$603,990
	3.38%	373%	$1,015	$341,090
82%	1.37%	0%	$775	$393,579

astewater treatment

Community	Expected % MHI w/o brine	Expected % MHI with brine
Kalispell		
Bozeman		
Helena		
Butte		